

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
16 September 2004 (16.09.2004)

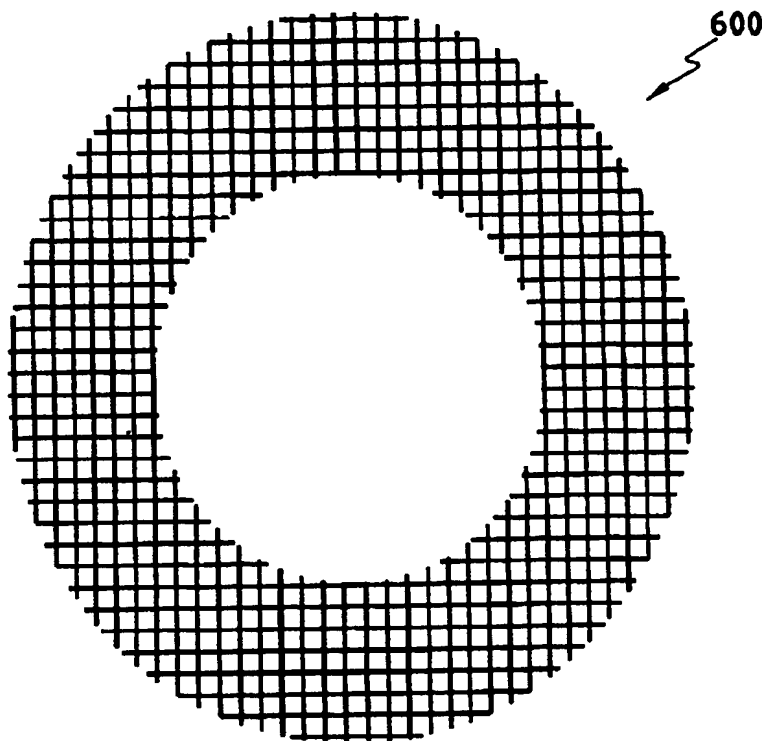
PCT

(10) International Publication Number  
**WO 2004/078406 A3**

- (51) International Patent Classification<sup>7</sup>: **F16D 69/02**,  
C04B 35/83, C23C 16/458, 16/44
- (21) International Application Number:  
PCT/EP2004/002144
- (22) International Filing Date: 2 March 2004 (02.03.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/450,678 3 March 2003 (03.03.2003) US
- (71) Applicant (for all designated States except US):  
MESSIER-BUGATTI [FR/FR]; Zone Aéronautique  
Louis Bréguet, F-78140 VELIZY-VILLACOUBLAY  
(FR).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **CHANG, Kenny**  
[US/US]; 10839 War Admiral Drive, UNION, KY (US).
- (74) Agents: **JOLY, Jean-Jacques et al.**; CABINET BEAU  
DE LOMENIE, 158 Rue de l'Université, F-75340 PARIS  
Cedex 07 (FR).
- (81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.
- (84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-  
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,  
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,

[Continued on next page]

(54) Title: ONE PIECE SHIM



(57) Abstract: A one-piece or otherwise unitary annular shim member made from a perforated metallic material is used to maintain a space between stacked annular preforms during a manufacturing process, such as densification. The metallic material used preferably can withstand at least the temperatures encountered during densification. The one-piece structure advantageously simplifies the arrangement of the preforms in a process chamber and causes less deformation in the preforms. In one example, the shim member is made from a metallic mesh and may utilize a crimped weave structure.

WO 2004/078406 A3



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

**Date of publication of the amended claims:** 9 June 2005

**Published:**

- with international search report
- with amended claims

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(88) Date of publication of the international search report:**  
9 December 2004

**AMENDED CLAIMS**

[received by the International Bureau on 17 December 2004 (17.12.04)]

1. An annular shim member having first and second opposing surfaces and a plurality of openings formed therethrough,  
wherein the member is made from a metallic material and at least partly defines a plurality of radially extending gas flow paths for communicating a radially interior side of the member with a radially exterior side of the member.
2. The member according to claim 1, wherein the metallic material is a bare metallic material.
3. The member according to claim 1, wherein the metallic material is a wire mesh.
4. The member according to claim 3, wherein the metallic material is a refractory material.
5. The member according to claim 3, wherein the metallic member comprises one or more of stainless steel, inconel alloy, titanium, molybdenum, tantalum, and tungsten.
6. The member according to claim 3, wherein the wire mesh has an open mesh area of about 20% to about 80%.

**AMENDED SHEET (ARTICLE 19)**